WHAT IS CLAIMED IS:

1. A double-helix electrode structure for sensing electrical activity of the diaphragm of a patient, comprising first and second helical electrodes disposed in a double-helix arrangement for being positioned in the gastro-oesophageal sphincter of the patient's diaphragm in view of sensing electrical activity of the patient's diaphragm.

2. A double-helix electrode structure as defined in claim 1, wherein the double-helix arrangement comprises a geometrical axis and constitutes a symmetrical arrangement of electrodes about said geometrical axis.

3. A double-helix electrode structure as defined in claim 1, wherein the first and second helical electrodes are coaxial electrodes.

4. A double-helix electrode structure as defined in claim 1, wherein the first and second helical electrodes each comprise at least one turn.

5. A double-helix electrode structure as defined in claim 1, wherein the double-helix electrode structure is a double-helix electrode structure having a diameter of about 5mm and a length of about 10 cm.

6. A double-helix electrode structure as defined in claim 1, wherein the double-helix electrode structure is a double-helix electrode structure having a diameter of about 5mm and a length of about 10 cm, and comprising helical electrodes each having a number of turns between 1 and 4.

7. A double-helix electrode structure as defined in claim 1, wherein the first and second electrodes have an *ECG*-attenuating pitch.

8. A double-helix electrode structure as defined in claim 1, wherein the double-helix arrangement comprises means for attenuating *ECG* disturbance by 10 to 25 *dB* with respect to an electrode structure formed of a serial array of electrodes.

9. A pressure detection and acquisition device, comprising:

a semiconductor substrate;

a pressure sensor implemented on the semiconductor substrate, said pressure sensor producing, when subjected to an external pressure, a pressure representative signal; and

a signal acquisition and transmission circuit integrated to the semiconductor substrate, said signal acquisition and transmission circuit being connected to the pressure sensor and supplied with the pressure representative signal.

10. A pressure detection and acquisition device as defined in claim 9, wherein the pressure sensor is integrated to the semiconductor substrate.

11. A pressure detection and acquisition device as defined in claim 9, wherein the pressure sensor comprises a pressure-deformable membrane having a face on which at least one piezoelectric element is mounted.

12. A pressure detection and acquisition device as defined in claim 11, wherein the pressure-deformable membrane is a semiconductor membrane and the at least one piezoelectric element is deposited on the face of the semiconductor membrane.

13. A pressure detection and acquisition device as defined in claim 11, wherein the pressure-deformable membrane is a semiconductor membrane and the at least one piezoelectric element is implanted in the semiconductor membrane.

14. A pressure detection and acquisition device as defined in claim 9, wherein the pressure detection and acquisition device is a monolithic semiconductor device.

15. A pressure detection and acquisition device as defined in claim 11, wherein the pressure-deformable membrane is made of a material selected from the group consisting of: a sink-P material formed by an implantation of Boron ions within a silicon substrate, SiO_2 and polycrystalline silicon.

16. A pressure detection and acquisition device as defined in claim 11, wherein the pressure-deformable membrane is a multi-layer membrane, and wherein each layer of the multi-layer membrane is made of a material selected from the group consisting of: a sink-P material formed by an implantation of Boron ions within a silicon substrate, SiO_2, and polycrystalline silicon.

17. A pressure detection and acquisition device as defined in claim 9, wherein the pressure-deformable membrane is made of semiconductor material and said at least one piezoelectric element is made of a material selected from the group consisting of: p^+-doped silicon and polycrystalline silicon.

18. A pressure detection and acquisition device as defined in claim 9, wherein the signal acquisition and transmission circuit comprises, integrated to the semiconductor substrate, an amplifier for amplifying the pressure representative signal, an analog-to-digital converter for converting the amplified pressure representative signal to a digital amplified pressure representative signal, and a stocking and serializing processor supplied with the digital amplified pressure representative signal, and a sequencer for controlling operation of the amplifier, analog-to-digital converter, and stocking and serializing processor.

19. An EMG_{di} signal and pressure acquisition catheter, comprising :

an esophageal catheter having an EMG_{di} signal and pressure acquisition portion;

a EMG_{di} signal detection electrode structure mounted on the acquisition portion of the esophageal catheter to detect an EMG_{di} signal produced by the diaphragm of a patient;

a gastric pressure sensor mounted on the acquisition portion of the esophageal catheter on a first side of the EMG_{di} signal detection electrode structure, to detect gastric pressure of the patient ;

an esophageal pressure sensor mounted on the acquisition portion of the esophageal catheter on a second side of the EMG_{di} signal detection electrode structure opposite to said first side, to detect esophageal pressure of the patient; and

an acquisition and transmission circuit connected to the EMG_{di} signal detection electrode structure, the gastric pressure sensor and the esophageal pressure sensor, and supplied with the detected EMG_{di} signal, the detected gastric pressure and the detected esophageal pressure.

20. An EMG_{di} signal and pressure acquisition catheter as defined in claim 19, wherein the EMG_{di} signal detection electrode structure comprises a double-helix electrode structure comprising first and second helical electrodes disposed in a double-helix arrangement for being mounted on the acquisition portion of the esophageal catheter and positioned in the gastro-esophageal sphincter of the patient's diaphragm.

21. An EMG_{di} signal and pressure acquisition catheter as defined in claim 20, wherein the double-helix arrangement comprises a geometrical axis and constitutes a symmetrical arrangement of electrodes about said geometrical axis.

22. An EMG_{di} signal and pressure acquisition catheter as defined in claim 20, wherein the first and second helical electrodes each comprise at least one turn.

23. An EMG_{di} signal and pressure acquisition catheter as defined in claim 20, wherein the double-helix arrangement comprises means for attenuating *ECG* disturbance.

24. An EMG_{di} signal and pressure acquisition catheter as defined in claim 19, comprising:

- a first pressure detection and acquisition device, comprising:

a first semiconductor substrate;

the gastric pressure sensor implemented on the first semiconductor substrate, said gastric pressure sensor producing, when subjected to gastric pressure, a gastric pressure representative signal; and

a first portion of the acquisition and transmission circuit integrated to the first semiconductor substrate, said first portion of the acquisition and transmission circuit being connected to the gastric pressure sensor and supplied with the gastric pressure representative signal; and

- a second pressure detection and acquisition device, comprising:

a second semiconductor substrate;

the esophageal pressure sensor implemented on the second semiconductor substrate, said esophageal pressure sensor producing, when subjected to esophageal pressure, an esophageal pressure representative signal; and

a second portion of the acquisition and transmission circuit integrated to the second semiconductor substrate, said second portion of the acquisition and transmission circuit being connected to the esophageal pressure sensor and supplied with the esophageal pressure

representative signal.

25. An EMG_{di} signal and pressure acquisition catheter as defined in claim 24, wherein the gastric pressure sensor is integrated to the first semiconductor substrate, and the esophageal pressure sensor is integrated to the second semiconductor substrate.

26. An EMG_{di} signal and pressure acquisition catheter as defined in claim 24, wherein the first portion of the acquisition and transmission circuit is also supplied with the detected EMG_{di} signal.

27. An EMG_{di} signal and pressure acquisition catheter as defined in claim 19, wherein at least one of the gastric and esophageal pressure sensors comprises a pressure-deformable membrane having a face on which at least one piezoelectric element is mounted.

28. An EMG_{di} signal and pressure acquisition catheter as defined in claim 24, wherein the first portion of the acquisition and transmission circuit comprises, integrated to the first semiconductor substrate, an amplifier for amplifying the gastric pressure representative signal, an analog-to-digital converter for converting the amplified gastric pressure representative signal to a digital amplified gastric pressure representative signal, a stocking and serializing processor supplied with the digital amplified gastric pressure representative signal, and a sequencer for controlling operation of the amplifier, analog-to-digital converter, and stocking and serializing processor.

29. An EMG_{di} signal and pressure acquisition catheter as defined in claim 24, wherein the second portion of the acquisition and transmission circuit comprises, integrated to the second semiconductor substrate, an amplifier for amplifying the esophageal pressure representative signal, an analog-to-digital converter for

converting the amplified esophageal pressure representative signal to a digital amplified esophageal pressure representative signal, a stocking and serializing processor supplied with the digital amplified esophageal pressure representative signal, and a sequencer for controlling operation of the amplifier, analog-to-digital converter, and stocking and serializing processor.

30. An EMG_{di} signal and pressure acquisition catheter as defined in claim 24, wherein:

the first portion of the acquisition and transmission circuit comprises, integrated to the first semiconductor substrate, a first amplifier for amplifying the gastric pressure representative signal, a first analog-to-digital converter for converting the amplified gastric pressure representative signal to a digital amplified gastric pressure representative signal, a first stocking and serializing processor supplied with the digital amplified gastric pressure representative signal, and a first sequencer for controlling operation of the first amplifier, first analog-to-digital converter, and first stocking and serializing processor; and

the second portion of the acquisition and transmission circuit comprises, integrated to the second semiconductor substrate, a second amplifier for amplifying the esophageal pressure representative signal, a second analog-to-digital converter for converting the amplified esophageal pressure representative signal to a digital amplified esophageal pressure representative signal, and a second stocking and serializing processor supplied with the digital amplified esophageal pressure representative signal, and a second sequencer for controlling operation of the second amplifier, second analog-to-digital converter, and second stocking and serializing processor.

31. An EMG_{di} signal and pressure acquisition catheter as defined in claim 28, wherein the first portion of the acquisition and transmission circuit is further

supplied with the detected EMG_{di} signal and comprises a selector of the detected gastric pressure representative signal or the detected EMG_{di} signal for being supplied to the amplifier.

32. An EMG_{di} signal and pressure acquisition catheter as defined in claim 30, wherein:

the first memory and serializing circuit produces first serial data supplied to the second memory and serializing circuit;

the second memory and serializing circuit produces second serial data; and

the second portion of the acquisition and transmission circuit further comprises a shaping circuit supplied with the second serial data, the shaping circuit converting the second serial data into a bitstream conforming with a given communication protocol.

33. An EMG_{di} signal and pressure acquisition catheter as defined in claim 32, further comprising a RF data transmitter for transmitting the bitstream from the shaping circuit to a remote processing system.